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II. "On the Forces that produce the great Currents of the Air and of the Ocean." By THOMAS HOPKINS, Esq. Communicated by J. P. JOULE, LL.D. Received December 2, 1859.

(Abstract.)

In this paper the writer pointed out the fact that we have at present no satisfactory evidence in books of what are the immediate causes of the great currents of the air and of the ocean; and he maintained that the liberated heat of condensing vapour is the cause of these currents. He then proceeded to show that all the great winds terminate in comparative vacua created in particular localities where much vapour has been condensed; and contended that such vacua enable and cause heavier air to press and flow towards the parts which have been rendered light,—to re-establish the equilibrium of atmospheric pressure,—thus making heat the disturbing power in the aërial ocean, and leaving gravitation to act to restore an equilibrium. The great primary currents of the ocean were also described, and they were shown to be so situated as to be under the influence of the principal winds, which, in their passage over the waters, press on them, and force them forward as currents. These currents were maintained to be of a velocity, extent, and depth proportioned to the strength and continuity of the wind, showing that the pressure of the air on the water, whilst moving over it, is capable of producing the movement which takes place. When, however, water is put into motion, it may be obstructed by land, and turned from its direct course, and in that way be made to form secondary currents. But it was contended that heat of vapour, set free in the atmosphere, is the force which disturbs the equilibrium of pressure, and either directly or indirectly produces all the great continuous movements that take place both in the atmosphere and the ocean.

III. "On the Movements of Liquid Metals and Electrolytes in the Voltaic Circuit." By GEORGE GORE, Esq. Communicated by Professor TYNDALL. Received December 1, 1859.

1. It has long been known that when a globule or layer of pure
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